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PATENT

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PATENT EXAMINING OPERATION**

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INVENTION : RECLOSABLE FLEXIBLE PACKAGE
AND METHOD FOR MAKING THE SAME

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TO ALL WHOM IT MAY CONCERN:

Be it known that we David E. Galomb and Lawrence Ashton, citizens of the United States of America, residing in Allentown, County of Lehigh, Commonwealth of Pennsylvania, and in Souderton, County of Montgomery, Commonwealth of Pennsylvania, have made a certain new and useful invention in a Reclosable Flexible Package And Method For Making The Same of which the following is a specification.

FIELD OF THE INVENTION

This invention relates generally to flexible packages, and more particularly to flexible packages for holding products, and which once opened are arranged to be repeatedly re-opened and re-closed, while keeping the contents fresh.

BACKGROUND OF THE INVENTION

- 5 Various types of flexible packages for holding particulate materials, e.g., pet foods, ground or whole bean coffee, chemicals, etc., under vacuum therein have been disclosed in the patent literature and are commercially available today. Examples of such packages are found in the following United States Letters Patent: 4,576,285 (Goglio), 4,705,174 (Goglio), and 4,913,561 (Beer).
- 10 One common type of flexible package for holding goods under vacuum until the package is opened is the so-called "gusseted" package or bag. Typically such a package is formed from a web of flexible stock material, e.g., polyethylene, polyester, polypropylene, metal foil, and combinations thereof in single or multiple plies, into a tubular body, having a face panel, a back panel, and a pair of gusseted sides. Each gusseted side is formed by a pair of gusset sections and a central fold edge interposed between a pair of outer fold edges. The lower end of the bag is commonly permanently sealed, e.g., heat sealed, along a line extending transversely across the width of the bag close to its bottom edge. The top of the bag is commonly sealed transversely across the entire width of the bag in a number of ways to maintain the contents under vacuum until the bag is opened. Such action is frequently accomplished via a readily openable mouth, which when opened provides access to the contents of the bag. For example, in one prior art package the top seal is made peelable by modifying the sealant layer with a peelable coating or incompatible additive. Thus, when the seal is peeled apart the unsealed portions form an open mouth through which the contents of the package may be removed. Another approach to providing an opening or mouth for a flexible package is that of the heretofore identified Patent No. 4,705,174 (Goglio). That package includes a peel strip applied to the inner surface of the package below the top edges. The strip provides an air-tight
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- 25

interfacial seal which can be readily peeled apart to provide access to the interior of the package. Another approach to providing an opening or mouth for a flexible package is to score the upper flap of the package by laser or mechanical means through a tear initiation resistant layer(s) of the package structure. In this way the package can be opened by tearing away the scored area to form the package's mouth.

5 Non-gusseted flexible packages, such as stand-up pouches, are commercially available and typically include so-called "zipper-type" closures. Examples, of such packages are shown in United States Letters Patent Nos. 5,059,036 (Richison et al.), and 5,147,272 (Richison et al.).

In United States Letters Patent No. 5,692,837 (Beer), which is assigned to the same assignee as this invention there is disclosed a gusseted flexible package having a integrated snap closure for re-closing and resealing the package after it has been initially opened. In particular, that package has an interior for initially holding some product, e.g., whole coffee bean or ground coffee, under vacuum, and which includes a mouth portion arranged to be peeled open to provide access to the contents of the package. The package is formed of a flexible material and includes a front panel, a rear panel, and a pair of opposed side gussets. 10 The panels and gussets each include a top portion, which between them define the package's mouth. A peelable closure is provided within the mouth. A snap closure is provided above the peelable closure. The package is arranged to be sealed under vacuum, with the peelable closure maintaining the vacuum within the package until it is peeled open. The snap closure comprises a pair of snap strip members secured to respective portions of the front and rear 15 panel. The snap strip portions are arranged to be releasably snap fit together with portions of the closure extending through opening in the side gussets, so that the snap strip portions can be opened and re-closed after the peelable closure has been peeled open in order to provide repeated access to the interior of the package, while minimizing the ingress of air into the 20 package when it is closed.

Other references involving closures for packages are found in United States Letters Patent Nos.: 6,234,676 (Galomb, et al.), 6,231,235 (Galomb, et al.), 6,132,089 (Galomb, et al.) and 6,082,897 (Galomb), assigned to the same assignee as this invention, disclose snap closures for flexible, gusseted packages and flexible gusseted packages including such closures. Each package includes a mouth portion arranged to be opened to provide access to 5 the contents of the package. The snap closure enable the resealing of the mouth of the package and each are made up of a pair of elongated elements, one of which includes a tongue extending along the length of it. The other element includes an undercut groove extending along the length of it. The elements are arranged to be pressed together, whereupon the tongue of the one element enters the groove of the other element with portions of the panels 10 and side gussets tightly interposed therebetween.

United States Letters Patent Number 6,296,388 (Galomb, et al.), also assigned to the same assignee as this invention, discloses a pour-spout closure for use on a gusseted flexible package. The package includes a pair of panels and a pair of gussets, each of which has an upper end portion which conjoin to form an openable pour-through mouth. The pour-spout 15 closure is arranged for opening and re-closing the package's pour-through mouth and comprises first and second, elongated closure sections which are coupled together. The first closure section includes a first cut-away portion, and is arranged to be located, e.g., secured, on the first panel with the first cut-away portion disposed over at least a portion of the pour-through mouth. The second closure section includes a second cut-away portion, and is 20 arranged to be located, e.g., secured, on the second panel with the second cut-away portion disposed over at least a portion of the pour-through mouth. The first and second closure sections are arranged to be moved with respect to each other, e.g., pivoted about an interconnecting hinge, into a confronting releasably secured relationship, whereupon portions of the first and second panels and the side gussets are contiguous with the pour-through mouth 25 are positioned adjacent one another to seal said package to prevent the ingress of air into the

package. The first and second closure sections are also arranged to be moved, e.g., pivoted about the hinge, into a non-confronting relationship, whereupon the pour-through spout is opened so that the material within the package can be poured therethrough.

United States Letters Patent Number 6,254,273 (Galomb, et al.), also assigned to the same assignee as this invention, discloses an interlocking pour-spout closure for a flexible, 5 gusseted package and a flexible gusseted package including such a closure. The package is formed of a flexible material and includes a front panel, a rear panel, and a pair of opposed side gussets. The package is initially sealed, e.g., by a peelable seal line. The panels and gussets each include a top portion. The package also includes a pour-through mouth, e.g., a portion of the panels and one side gusset is arranged to be removed from the remainder of the package. 10 The pour-through mouth is located at the top of the package at one of the side gussets and is arranged to be opened by the pour-spout closure to provide access to the contents of the package. The closure includes a pair of closure sections hingedly secured to each other and each section includes a cut-away portion. Each of the closure sections is arranged to be secured to a respective one of the package's panels, with respective cut-away portions 15 disposed over the at least a portion of the pour-through mouth of the package. The closure sections are arranged to disposed in a confronting releasably secured relationship with each other with portions of the first and second panels and the gussets contiguous with the package's mouth tightly interposed therebetween to close the pour-through mouth, but can be pivoted about the hinge into a non-confronting relationship, whereupon the pour-through mouth 20 is opened so that the material within the package can be poured therethrough.

United States Letters Patent Number 6,139,187 (Galomb, et al.), also assigned to the same assignee as this invention, discloses an interlocking pour-spout closure for a flexible, gusseted package and a flexible gusseted package including such a closure. The package is formed of a flexible material and includes a front panel, a rear panel, and a pair of opposed side 25 gussets. The package is initially sealed, e.g., by a peelable seal line. The panels and gussets each include a top portion. The package also includes a pour-through mouth, e.g., a portion of

the panels and one side gusset is arranged to be removed from the remainder of the package. The pour-through mouth is located at the top of the package at one of the side gussets and is arranged to be opened by the pour-spout closure to provide access to the contents of the package. The closure includes a pair of closure sections hingedly secured to each other and each section includes a cut-away portion. Each of the closure sections is arranged to be secured to a respective one of the package's panels, with respective cut-away portions disposed over the at least a portion of the pour-through mouth of the package. The closure sections are arranged to disposed in a confronting releasably secured relationship with each other with portions of the first and second panels and the gussets contiguous with the package's mouth tightly interposed therebetween to close the pour-through mouth, but can be pivoted about the hinge into a non-confronting relationship, whereupon the pour-through mouth is opened so that the material within the package can be poured therethrough.

United States Letters Patent Number 4,317,478 (Babbidge) discloses a self-closing, snap-open pouch or sack type of flexible container having closure that is more transversely flexible in one direction than in the other under longitudinal load and/or more outwardly flexible at or toward its center than at its ends. Opposed transverse creases adjacent the ends of each closure strip insure that the strips will spring apart under a longitudinal compressive load applied substantially to both strips. The walls of the containers are made from sheet material with a pair of closure strips secured to the sheet margins; longitudinal center folding of the sheet brings the closure strips into opposed juxtaposition and allows the folded sheet to be severed and end-sealed to form individual containers and place the ends of one closure element in a pivotal relationship with the ends of an opposite closure element.

United States Letters Patent Number 6,402,375 (Schreiter, et al.) discloses a slider device includes a top wall, first and second sidewalls, and a separating structure. The first sidewall depends from the top wall and includes a first hooking construction. The second sidewall also depends from the top wall and includes a second hooking construction. The top wall and first and second sidewalls define a first cavity that operably receives a closure

mechanism having first and second selectively engageable closure profiles. The separating structure selectively separates the first and second profiles of the closure mechanism. The separating structure includes a stabilizer and a separator. The stabilizer extends from the second sidewall and the second hooking construction into the first cavity. The stabilizer retains a lower portion of the second closure profile proximate to a lower portion of the first closure profile. The separator depends from the top wall and extends from the first sidewall into the first cavity. The separator applies pressure to an upper portion of the second closure profile to push the upper portion of the second closure profile away from an upper portion of the first closure profile, causing the first and second closure profiles to separate.

United States Letters Patent Number 6,293,701 (Tomic) discloses a slider device for use with a resealable package includes a top wall with first and second ends, a spreader depending from the top wall, a first sidewall, a second sidewall, a first hook construction extending from the first sidewall, a second hook construction extending from the second sidewall, and a guide construction. Preferably, the slider device includes a pair of drag-reducing standoffs in projection from the sidewalls. In preferred embodiments, the guide construction includes first and second fingers projecting beyond at least one end of one of the sidewalls. The slider device is usable with a reclosable zipper arrangement defining a pair of shoulders for engaging with the hook constructions of the slider device. Certain embodiments may include ridge structure on the slider and zipper for providing tactile feedback to the user. In another embodiment, there may be a color change as the zipper changes condition from an open position to a closed, interlocked position. Methods of assembling and operation are described.

United States Letters Patent Number 6,247,844 (Tomic, et al.) discloses a resealable slider closure mechanism includes a first closure profile, a second closure profile, a slider, and a plow. The plow is a separate piece that is attached to the slider at a later time. The plow has an attachment peg extending from it, while the slider has a cavity adapted to receive the attachment peg. The attachment peg is press-fitted, snap-fitted, or welded into the cavity. Alternatively, the plow has a tongue instead of an attachment peg while the slider has a groove

instead of a cavity adapted to receive the tongue. The tongue is press-fitted, snap-fitted, or welded into the groove. The slider and the plow are designed to receive the first and second closure profiles, to slide along the first and second closure profiles in a first direction to cause the first and second closure profiles to engage, and to slide along the first and second closure profiles in a second direction to cause the first and second closure profiles to disengage.

5 Furthermore, a plow for use with a closure arrangement having first and second closure profiles includes first and second side walls that are tapered at one end to cause the first and second closure profiles to engage.

United States Letters Patent Number 6,306,071 (Tomic) discloses a single-piece slider device for use with resealable closure mechanisms having a first closure profile and a second closure profile is provided. The slider device includes a rigid top wall, at least a first plow for separating the first and second closure profiles, a first sidewall, and a second sidewall. The first and second sidewalls each have an inner surface, an outer surface, a bottom edge, and a length. The first sidewall has a first flex point arranged and configured to allow the first sidewall to flex at the first flex point. The second sidewall has a second flex point arranged and configured to allow the second sidewall to flex at the second flex point. The flexpoints can be notches on the outer portions or inner portions of the sidewalls, between the top wall and the sidewalls, or between the sidewalls and the bottom portions. The top wall can have depending tabs to help align the slider device with the profiles. Further embodiments include guide rails and tracks on the profiles and sidewalls, sloped surfaces on the profiles and sidewalls, surface ridges, an opening in the top wall of the slider device, and a secondary closure mechanism.

10 Methods of construction are described.

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United States Letters Patent Number 6,524,002 (Tomic) discloses a slider device for use with a resealable package includes a top wall with first and second ends, a spreader depending from the top wall, a first sidewall, a second sidewall, a first hook construction extending from the first sidewall, a second hook construction extending from the second sidewall, and a guide construction. The first and second hook constructions have sloped or tapered surfaces that

facilitate mounting of the slider device on a reclosable closure construction, such as a zipper arrangement. Methods of assembling and operation are described.

5,037,138 (McClintock, et al.) discloses a reclosable package for containing and protecting product disposed therein including an initial seal and a releasable snap-closure mechanism adapted to maintain a tight closure between the product and the environment after
5 the initial seal is broken, the snap-closure mechanism adapted to be snapped open and remain in the open position without the application of pressure so that the product may be easily dispensed therefrom and, when pressure is applied, to snap back to the closed position.

United States Letters Patent Number 4,871,264 (Robbins, III, et al.) discloses bag closure devices include elongate male and female members each having a wall which is generally U-shaped in cross-sectional configuration and terminating in a pair of opposing, separated edge regions which define therebetween a slot extending the axial length of the members. The U-shaped walls of the male and female members are formed of a resilient, shape-retaining plastic material (e.g., PE) which permits the opposing edge regions to be resiliently displaced relative to one another so as to facilitate the entry of the male member into
10 a generally cylindrical interior space defined by the female member when the two members are moved into frictional nested relationship. The male and female members are preferably interconnected to one another by an integral hinge which facilitates moving the same into such nested relationship. A locking member may optionally be provided so as to releasably lock the male and female members in their nested relationship. The devices are fabricated by extruding
15 the material into a preform which, in one embodiment, includes oppositely oriented U-shaped preforms of the male and female members separated by a substantially planar central region, the preforms extending parallel to the extrusion axis. In another embodiment, a continuous U-shaped preform is extruded and opposing wall sections thereof are removed to establish the male and female members interconnected to one another by the region which remains after
20 removal of the wall sections.
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United States Letters Patent Number 4,997,104 (Pohl) discloses a closure apparatus which includes a scroll-like closure panel of flexible material is used to resealably close the open end of a bag-like container. The closure panel has opposite inner and outer longitudinal edges, with its outer edge spirally wound about its inner edge. The closure panel is biased to define a coil in lateral section when the panel is in equilibrium. For closing the open end of the bag-like container, the end edges of an open end of the bag-like container are spirally captivated within the coil defined by the closure panel.

United States Letters Patent Number 4,787,755 (Branson) discloses a reclosable pouch is provided having front and back walls and an opening along its upper edge. A first fastener profile is sealed on its ends to the exterior of the front wall of the pouch. The fastener profile extends longitudinally near the pouch opening. A second fastener profile is sealed on its ends to the exterior of the back wall of the pouch. The first and second fastener profiles each have a rib member extending longitudinally thereon and a groove for reception of the oppositely disposed rib. The fastener profiles are adapted for interlocking with the front and back walls of the pouch being interposed therebetween.

United States Letters Patent Number 4,787,754 (Herrington) discloses a reclosable flexible bag having a tape of greater thickness around its opening portion. On the surfaces of the tape facing the bag, fastener profiles are provided to seal the bag by pinching the bag walls therebetween.

United States Letters Patent Number 5,944,425 (Forman) discloses flexible packages having an openable and resealable interlocking closure made from a continuous web of flexible film, the closure being formed transversely to the direction of film flow at the consumer preferred position across one end of the package during package formation at line speed.

United States Letters Patent Number 4,807,300 (Ausnit, et al.) discloses a bag structure especially adapted to be made from bag body web material, and fusibly incompatible extruded plastic zipper, comprises a pair of zipper strips having reclosable zipper profiles located below upper ends of pull flanges. Fused connecting anchors extend from the zipper strips through

holes in the material of the bag body material and thereby permanently attach the zipper strips to the bag body material. Anchorage of the bag body material may be in groove sockets provided by the zipper strips. The zipper strips may be located on the inside or the outside of the bag structure. A pilfer evident seal may be provided along the pull flanges and require destruction of the seal to gain access into the bag through the reclosable zipper.

5 SUMMARY OF THE INVENTION

One aspect of this invention is directed to the combination of a flexible package and a snap-closure for the package. The package has an interior for holding material therein and an openable mouth communicating with the interior and is formed of a flexible material. The package basically comprises first and second panels connected to each other, each of the panels has an exterior surface and an interior surface. The mouth of the package is openable to provide access to the interior of the package.

The snap closure is arranged for closing and sealing the mouth of the package and comprises a male closure element and a female closure element. The male closure element basically comprises a generally planar base member and a wall projecting upward from the base member and defining a enclosed space bounded by the periphery of the wall of the male closure element. The female closure element basically comprises a generally planar base member and a wall projecting upward from the base member and defining a enclosed space bounded by the periphery of the wall of the female closure element. The male closure element is secured to the first panel of the package adjacent the package's mouth. The female closure element is secured to the second panel of the package adjacent the package's mouth.

The wall of the male closure element is arranged to snap-fit into engagement with the wall of the female closure element to hold portions of the first panel of the package in a confronting relationship with portions of the second panel of the package to close the package's mouth to impede the ingress of air into the package therethrough.

In accordance with one preferred embodiment of this invention, the snap closure may include a valve, e.g., a one-way valve, to enable gas to vent from the interior of the package through the valve, without enabling air to get into the package.

In accordance with another preferred embodiment of this invention, the snap closure may include a locking mechanism, e.g., a manually movable element, which impedes or precludes the closure's two components from separating from each other.

This invention also entails methods of making the various reclosable packages of this invention.

DESCRIPTION OF THE DRAWING

Fig. 1 is an exploded isometric view of one exemplary embodiment of a snap-closure device for flexible packages constructed in accordance with this invention;

Fig. 2A is a reduced isometric view of one exemplary embodiment of a flexible package utilizing the snap-closure device of Fig. 1, showing the package in its open state;

Fig. 2B is a view similar to Fig. 2A, but showing the package after being reclosed.

Fig. 3 is a reduced isometric view of another exemplary embodiment of a flexible package utilizing the snap-closure device of Fig. 1, showing the package in its open state;

Fig. 4A is a reduced isometric view of another exemplary embodiment of a flexible package utilizing the snap-closure device of Fig. 1, showing the package in its open state;

Fig. 4B is a view similar to Fig. 4A, but showing the package in the process of being reclosed;

Fig. 4C is a view similar to Figs. 4A and 4B, but showing the package after being reclosed;

Fig. 5 a reduced isometric view of another exemplary embodiment of a flexible package, similar to that of Fig. 4A, but utilizing the snap-closure device of Fig. 8 and showing the package in its open state;

Fig. 6 is an exploded isometric view of another exemplary embodiment of a snap-closure device, e.g., a vented snap-closure, for flexible packages constructed in accordance with this invention;

Fig. 7 is an exploded isometric view of another exemplary embodiment of a snap-closure device, e.g., a lockable snap-closure, for flexible packages constructed in accordance with this invention;

Fig. 7A is bottom plan view of the female component of the lockable snap closure device of Fig. 7;

Fig. 7B is bottom plan view of the male component of the lockable snap closure device of Fig. 7;

Fig. 7C is a transverse sectional view of the lockable snap closure device of Fig. 7 shown in its open state;

Fig. 7D is a transverse sectional view of the lockable snap closure device of Fig. 7 shown in its closed and locked state; and

Fig. 8 is an isometric view of another exemplary embodiment of a snap-closure device, e.g., an integral snap-closure, for flexible packages constructed in accordance with this invention, e.g., the package of Fig. 5.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the various figures of the drawing wherein like reference characters refer to like parts, there is shown in Fig. 2A, a flexible package 20 constructed in accordance with one exemplary embodiment of this invention. The package 20 basically comprises a gusseted bag 22 and two re-sealable closures 24. It should be noted that the package 20 may include only one closure 24, or may include more than two closures, depending upon the size of the package and or other factors, e.g., the type of product or material to be held within the package. In this embodiment, the bag 22 is arranged to hold any product or material, e.g., coffee beans, ground coffee, chemicals, etc. and is formed of a web of any suitable, flexible material in a manner to be described hereinafter. In particular, the package 22 basically

comprises a front wall or panel 26, a rear wall or panel 28, a pair of identical gusseted sides 30 and 32, a top end portion 34, and a bottom end portion 36. The top end portion 34 of the package terminates in a top marginal edge 38. In a similar manner the bottom end portion 36 terminates in a bottom marginal edge 40. If desired, a one-way venting valve (not shown) may be included in any suitable portion of the package to enable gases which may be produced by the material(s), e.g., coffee, contained within the sealed package to vent to the ambient air without air gaining ingress to the package's interior. In accordance with one preferred exemplary embodiment of the invention one or more of the closure 24 may include a one-way venting valve to enable gases to vent to the ambient air without air gaining ingress to the package's interior.

The front panel 26, rear panel 28, and the two gusseted sides 30 and 32 of the package are all preferably integral portions of a single sheet or web of the flexible material, of single or multiple ply or layers, which has been folded and seamed along a seam or fin 42 in the rear panel 28 to form a tubular body. One particularly useful flexible material for the package 22 is a laminated web of flexible packaging material commercially available from Fres-Co System USA, Inc., of Telford PA, the assignee of this invention. That material comprises a 48 gauge polyester layer, ink, an adhesive layer, a 28 gauge aluminum foil layer, another adhesive layer, a 60 gauge nylon layer, another adhesive layer, and a 300 gauge easy open sealant layer. When a web of such material is formed into the tubular body for the package the polyester layer serves as the outer surface of the package, with the easy-open sealant layer being the inner surface of the package. The sealant layer forms an easy-to-open mouth 44 for the package 20. The bottom or lower portion of the package is sealed by a permanent transverse seal line 46 (as is conventional).

It should be pointed out at this juncture that the flexible package may be, without limitation, a side gusseted bag (like that shown and described), a stand-up pouch, or a flat pouch that is typically constructed from one or more plastic materials, such as polyethylene (PE), polypropylene (PP), nylon (PA) or polyester (PET). Other materials, such as aluminum

foil and paper may also be incorporated into the package construction if desired. When multiple materials are used to construct the package, they are typically laminated or otherwise bonded together in such a way as to create the desired characteristics of the package.

As can be seen clearly in Figs. 2A, the two closures 24 of the exemplary embodiment shown therein are located in the top end portion 34 of the package. The details of the closures 5 24 will be described later with reference to Fig. 1. Suffice it for now to state that each closure 24 is made up of a pair of mating components, namely, a male component 24A and a female component 24B. The two components are arranged to releasably snap-fit together to enable each closure to be readily opened and closed repeatedly.

In the exemplary embodiment shown in Fig. 2A, the male component 24A of each of the 10 closures 24 is fixedly secured, e.g., welded, to a portion of the rear panel 28, while the female closure element is fixedly secured, e.g., welded to a portion of the front panel. This is merely exemplary. Thus, the male component 24A may be fixedly secured to the front panel and the female component may be fixedly secured to the rear panel. In fact, the male component of one closure may be secured on the front panel, while the male component of the other closure is 15 fixedly secured to the rear panel. In such an arrangement, the female component of the one closure will be fixedly secured to the rear panel, and the female component of the other closure will be fixedly secured to the front panel. In the exemplary embodiment shown the male component 24A of each closure, is fixedly secured, e.g., welded, to the rear panel 28 a short distance below the top edge 38. In this embodiment the female component 24B of each of the 20 closures 24 is fixedly secured, e.g., welded, to a portion of the front panel 26 closer to the top edge of that panel than the male components 24A.

The package 20 is arranged to be initially hermetically sealed closed along a transverse, openable, e.g., peelable, seal line (not shown), after it has been filled and vacuumized. The seal line extends across the width of the bag 22 and seals the inner surfaces of the abutting 25 front and rear panels to each other between the inner fold lines of the gussets 30 and 32, respectively, while sealing the outer marginal portions of the front panel 26 to the portions of

the gusseted sides contiguous therewith, while also sealing the outer marginal portions of the rear panel 28 to the portions of the gusseted sides contiguous therewith, as is conventional. Thus, the openable seal line serves to isolate the contents of the package from the ambient atmosphere once it is sealed. The seal line may be formed by the appropriate heat sealing of the abutting easy-open sealant layer portions forming the inner surface of the bag 22.

5 Alternatively, the peelable seal line can be formed in any other conventional manner, e.g., the use of peelable sealing strips like that disclosed in the aforementioned Goglio patents, whose disclosures are incorporated by reference herein.

In the embodiment shown in Fig. 2A, the package 20 includes a optional handle 48 for enabling one to support or hold it. The handle 48 is in the form of a rectangular hole that is die-cut in the front and rear panels 26 and 28, respectively, close to the top edges thereof and between the female components 24B of the two closures 24. In such an arrangement, it is preferred that the peelable or openable seal line for the package be located at any place below the handle 48. One preferable location for the peelable seal line is centered between the male and female components of the two closures 24.

10 When the package 20 is filled, vacuumized, and sealed its contents will be kept isolated from the ambient air by the openable seal line. At this time the two closures 24 can be open, i.e., not snap-fit together, such as shown in Fig. 2A. Alternatively, the two closures can be closed, such as shown in Fig. 2B, whereupon their male and female components 24A and 24B, respectively, are interconnected or snap-fit together. In the later case, the top portion 34 of the package is folded down along a fold line located between the male and female components of the two closures to form a flap and to bring the female components of both closures into a confronting relationship with the male components of those closures, whereupon they may be snap-fit together (as will be described later). If desired the flap may be held in place by a strip of adhesive tape (not shown) or some other adhesive means, so that the package is "brick-like"

15 in shape to facilitate stacking or storage.

As should be appreciated by those skilled in the art the use of the peelable seal line enables the package 20 to be readily opened by merely grasping the top edges of the front and rear panels and pulling them apart to cause the peelable seal line to open, thereby opening the mouth 44 of the package to provide access to the interior of the package. If the closures 24 had been snap-fit together, the action of peeling open the seal line will also disconnect or separate
5 the male and female components of the two closures. The contents of the package can then be poured or otherwise removed through the package's mouth.

It should be pointed out at this juncture that the package 20 may include a non-openable or permanent seal line, e.g., a permanent heat seal, in lieu of the peelable seal line. In such an arrangement the permanent seal line will be located above the two closures 24. To
10 open such a package, one can sever it below the heat seal line and above the closures 24. The newly formed top edge of the front and rear panels of the package which were formed by severing action can then be grasped and pulled apart to open the mouth of the package.

In any case, whether the package includes an openable seal line or a permanent seal line, once the package is opened, it can be reclosed to re-isolate its contents from the ambient
15 atmosphere by snap-fitting the components of the two closures together. Before describing that action, the details of the male and female components of each closure 24 will now be described with reference to Fig. 1. Thus, as can be seen, the male component 24A of the closure 24 basically comprises a generally planar base 50 having a circular profile. A circular sidewall 52 projects upward from the inner surface of the base 50. The outer diameter of the sidewall 52
20 is slightly less than the diameter of the base 50. The outer surface of the sidewall 52 contiguous with its free or top edge is in the form of a triangular shaped ridge 54 (See Figs. 1 and 7C). The female component 24B of the closure 24 also basically comprises a generally planar base 50 having a circular profile. A circular sidewall 56 projects upward from the inner surface of the base 50 of the female component. The outer diameter of the sidewall 56 is
25 slightly less than the diameter of the base 50 and the inner diameter of the sidewall 56 is slightly less than the outer diameter of the male component sidewall 52. The inner surface of the

sidewall 56 contiguous with its free or top edge is in the form of a triangular shaped ridge 58 (See Fig. 7C). The components 24A and 24B are arranged to be releasably secured together. In particular, the sidewall 54 of the male component is arranged to enter into the space bounded by the sidewall 56 of the female component. This action is accomplished by bringing the male and female components into a confronting relationship and applying pressure to the 5 outer surfaces of their respective planar bases, whereupon the triangular ridge 54 of the male component rides over the triangular ridge 58 of the female component to snap-fit into the space below the ridge 58 bounded by the inner surface of the sidewall 56 of the female component, as shown in Fig. 7D.

10 Each closure 24 is preferably constructed of a plastic material, such as low-density polyethylene (LOPE), high-density polyethylene (HOPE), or polypropylene (PP), and will typically be compatible with at least one exposed surface of the flexible package material forming the package's panels, thus enabling it to be welded or otherwise bonded to the panels of the package, as will be described later. It should also be pointed out that while the closures 15 24 have been described as including a male component and a female component, it should be appreciated the terms "male" and "female" are not intended to limit the design of the respective parts. Thus, for example, each component may have a combination of wall portions having extended areas and undercut areas incorporated therein. Accordingly, when one such component is mated against an opposing component, the arrangement allows them to 20 releasably interlock or snap-fit together. In the embodiment described above, the male and female components are both disc, e.g., circular, shaped. They can be other geometric shapes as well, e.g., oval, rectangular, triangular, etc. and will vary in size according to the size and type of package they are designed to accommodate. In general, the larger and more substantial the package is, the larger and more substantial the snap closure will need to be in order to 25 accommodate reclosing of the package. On a very small package, the diameter of the male and

female components may each be 10mm or less. On a larger more substantial package, the male and female parts may each be 30mm in diameter or more.

In the embodiment shown in Fig. 2A the male closure components 24A are welded to the inner surface of the rear panel 28. To that end the rear panel includes a first pair of circular openings or apertures 60 die-cut therein. Each opening 60 is of slightly larger diameter than the outer diameter of the sidewall 52 of the male component 24A to enable the sidewall 52 of the male component to be extended therethrough to project upward from the outer surface of the rear panel 28. Each male closure component 24A is welded or otherwise bonded to the inner surface of the rear panel contiguous with a respective opening 60 by the portion of the inner surface of the base member 50 extending radially outward from the sidewall 52. The female closure components 24B are welded to the inner surface of the front panel 26 by the outer surface of their respective base members 50, whereupon their respective sidewalls 56 project upward from the inner surface of the front panel. The rear panel 28 includes a second pair of circular openings or apertures 62 (only one of which can be seen) die-cut therein. Each opening 62 is of slightly larger diameter than the outer diameter of the sidewall 56 of the female component to enable that sidewall to be extended therethrough to project upward from the outer surface of the rear panel 28. With such an arrangement, the bag 22 can be folded along a transverse fold line between the male and female components to bring the male and female components into a confronting relationship, whereupon they can be snap-fit together like described above and as shown in Fig. 2B.

It should be pointed out at this juncture that the mounting of the male and female components onto the front and rear panels of the bag 22 as just described is merely exemplary. Thus, for example, the female components can be secured to the outer surface of the front panel and in such case the front panel would include a pair of openings or apertures 60 through which the sidewalls of the two female components would extend to project upward from the inner surface of the front panel.

In Fig. 3 there is shown an alternative exemplary package 100 constructed in accordance with this invention. The package 100 is similar in construction to the package 20, except that it doesn't include any openings 60 or 62 and the male and female components of the two closures 24 are already in a confronting relationship with each other. In the interest of brevity the common components of the packages 20 and 100 and of the closures 24 will be given the same reference numbers and their construction and operation will not be reiterated. Thus, as can be seen in Fig. 3 the two female components 24B are fixedly secured onto the inner surface of the front panel 26 in the same manner as in the embodiment of the package 20. The male closure components 24A are secured onto the inner surface of the rear panel 28 directly opposite the female components in the same manner that the female components are secured to the inner surface of the front panel 26.

In Fig. 4A there is shown another alternative exemplary package 200 constructed in accordance with this invention. The package 200 is similar in construction to the package 20, except that it includes two additional pairs of openings 202 and the male and female components of the two closures 24 are both secured to the rear panel. In the interest of brevity the common components of the packages 20 and 200 and of the closures 24 will be given the same reference numbers and their construction and operation will not be reiterated. Thus, as can be seen in Fig. 4A the two female components 24B are fixedly secured onto the inner surface of the rear panel 28 in the same manner the male components 24A are secured to the rear panel in the embodiment of the package 20. The two male closure components 24A are also secured onto the inner surface of the rear panel 28 in the same manner and are located directly below the female components 24B. Accordingly, the circular sidewalls 56 of the two female components 24B and the two circular sidewalls 52 of the two male components 24A project upward from the outer surface of the rear panel 28. The pair of openings or apertures 202 are located in the front and rear panels 26 and 28, respectively, immediately below the top edges thereof. The package 200 is arranged to be closed by folding down the top portion of the package to form a flap, whereupon the sidewalls 56 of the two female components 24B

extend through the opening 202 like shown in Fig. 4B. Then the folded-over portion at the top of the package 200 is folded down to bring the female closure components 24B into confronting relationship with the male closure components 24A so that they can be snap-fit together to complete the closure of the package as shown in Fig. 4C. This folding over operation also helps to isolate the contents of the package from the outside environment.

5 In accordance one preferred aspect of this invention, the snap closures for any of the packages may be constructed to function as a vent, allowing air to exchange between the inside and outside of the package. To that end, in Fig. 6 there is shown a snap-closure 24 that includes such a vent. The closure 24 shown in Fig. 6 is similar in construction to the closure 24 described earlier. Thus, in the interests of brevity the common components will be given the same reference numbers and the details of their construction and operation will not be reiterated. As can be seen in Fig. 6 the male component 24A includes a circular vent 70 in the center of the base member 50. The female component 24B also includes an opening or hole (not shown) in its base member and which will be in communication with the vent 70 of the male component when the male and female components are snap-fit together. A cruciform-shaped support frame 72 is located within the vent of the male component 24A to serve as a support for a planar filter disk, e.g., a circular filter paper, 76 covering the vent. The filter paper (or any other barrier) is provided to cover the vent area of the male component to prevent the product within the package from escaping from the package through the vent and also to reduce moisture transfer between package's interior and the ambient atmosphere. The filter paper disk 10 is preferably heat sealed or otherwise bonded to the outer surface of the base member 50 of 15 the male component over the vent 70.

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Packages 20 constructed in accordance with this invention and incorporating vents as described above have particular utility for applications wherein plural packages are disposed one on top of another, e.g., are palletized. As will be appreciated by those skilled in the art 25 flexible packages that have air trapped within them are somewhat difficult to stack. By using a

vent in the package, like just described, air can readily vent from within the package when it is stacked, thereby presenting a relatively flat, filled package that is amenable to stable stacking.

As will be appreciated by those skilled in the art, the drawback of the use of a vent for some applications is that it continues letting air exchange after the package is sealed (albeit the air exchange may be restricted to one small area adjacent the vent). Accordingly, where air exchange is undesirable, the vent may be made sealable, i.e., the vent can be plugged or otherwise sealed after the bag is filled, sealed, and the excess air squeezed out of it. This may be accomplished by means of a mechanical bag flattener placed on a conveyor downstream from the bag's sealer. The plugging the vent can be achieved by either ultrasonic welding apparatus placed in front of the snap closures, causing the vent holes to be melted closed, or by the molded snap closure itself being designed to have one portion that can be used to plug the vent hole when it is mechanically pressed against the vent hole. Further still, a combination of these two techniques can be used, e.g., a plug is pushed into the receiving area of the snap closure and then melted in place to re-create the hermetically sealed package.

While not shown, the closure 24 of Fig. 6 may include an one-way valve in lieu of a vent

15 70. In such an arrangement the valve is preferably located within the male component, i.e., located within the space bounded by the inner surface of the base member 50 and the sidewall

52. The female component will have an opening through its base member 50 for communication with the valve when the two components are snap-fit together. The valve may be any conventional type of one-way valve used in packaging for enabling gases to vent from

20 the package, while preventing ambient air from entering the package.

Alternatively, the closure 24 may include a two-way valve for certain applications, e.g., packaging of dry pet foods. One particularly effective valve for such applications is that shown and described in United States Letters Patent No.: 5,893,461 (Walters), assigned to the same assignee as this invention and whose disclosure is incorporated by reference herein. A valve

25 for such applications is preferably be constructed making use of the cross-cut disk component

shown in Fig. 7 of that patent. It should be noted that the two-way valve need not be located within the snap closure 24, but could be located in a panel of the bag 22 itself.

In accordance with another preferred aspect of this invention, the snap closures of this invention may incorporate a locking feature to deter unauthorized opening of the package or to prevent accidental opening. In Figs. 7, 7A, 7B, 7C and 7D there is shown one preferred embodiment of a closure 24 including such a locking feature. The closure 24 shown in Fig. 7 is similar in construction to the closure 24 described earlier. Thus, in the interests of brevity the common components will be given the same reference numbers and the details of their construction and operation will not be reiterated. As can be seen in Figs. 7 and 7A - 7D the male component 24A includes a manually operable locking member in the form of central cylindrical shaft 78 extending through a central hole in the base member 50. The shaft includes at its upper end a cap 80 (Figs. 7 and 7C) having an recess or slot 82 for receipt of a key or other tool (not shown). The lower end of the shaft is in the form of a rectangular block 84 (See Figs. 7B - 7D). The shaft is arranged to be rotated about its central longitudinal axis by inserting the tool within the recess or slot 82 and twisting the tool either clockwise or counter clockwise. The female component includes a pair of stand-offs 86 projecting upward from the inner surface of its base member 50 and which are disposed diametrically opposite each other. The top end of each stand-off is in the form of an overhanging projections or fingers 88 (See Figs. 7 and 7C). The spacing between the overhanging projections 88 is less than the length of the rectangular block 84 of the male component, but greater than the width of that block.

Use of the locking mechanism of the embodiment of the closure shown in Fig. 7 is as follows. The locking member is moved into the orientation shown in Fig. 8 by means of the tool, whereupon the male and female components can be snap fit together, i.e., the block 84 is oriented so that it fits between the overhanging projections 88 and into the space therebelow. Then the cap 80 of the locking member is moved into the orientation shown in Fig. 7D, whereupon the end portions of the block 84 are disposed under the overhanging projections

88. This action will prevent the male and female components from separating until the locking member is again rotated to the orientation shown in Fig. 7C.

Fig. 8 shows an alternative embodiment of the closure 24 shown in Fig. 1. The closure 24 in Fig. 8 is identical in all respects to that of Fig. 1, except that the male component 24A and the female component 24B are secured together by a flexible strip or bridge 90, thereby forming 5 an integral unit. The bridge is preferably integral with the male and female components, e.g., is molded as an integral unit from a plastic material. The bridge 90 includes a recess 92 extending transversely across its width to facilitate the bending or flexure of the bridge 90. The use of the integral unit closure 24 shown in Fig. 8 facilitates the manufacture of a package like the embodiment 200 shown in Fig. 4A. In particular, as can be seen in Fig. 5, the joined male 10 and female components 24A and 24B, respectively, of one integral closure 24 can be manipulated as a unit for securement to the rear panel 28. The other integral closure can also be manipulated as a unit for securement to the rear panel 28. The flexible bridge 90 serves to pre-align the male and female components with each other. Typically, the integral unit closure 24 is positioned on the back panel 28 of the package so the hinge point or recess 92 rests 15 along the second fold line of the flexible package, i.e., the top fold line or edge of the package shown in Fig. 4C.

It should be pointed out at this juncture that the various embodiments of the packages and the closures for the packages shown are merely representative of a myriad of different embodiments contemplated by this invention. For example, the closures may be mounted in any 20 way on the package's panels either extending through holes or not. Moreover, the base portion 50 making up the male and female components need not be planar. For example, it is contemplated that the male and female components could be shaped like "skimmer" shaped hats. In this regard, the male component could have a circular cylindrical side wall (like side wall 52), a circular planar top wall closing the side wall, and an annular planar disk (analogous to 25 the brim of a hat) extending radially outward about the periphery of the circular side wall, with the annular disk being disposed parallel to the circular planar top wall. The female component

could have a circular cylindrical side wall (like side wall 56), a circular planar bottom wall closing the side wall, and an annular planar disk (analogous to the brim of a hat) extending radially outward about the periphery of the circular side wall, with the annular disk being disposed parallel to the circular planar bottom wall. In such an arrangement, the portion of the male component made up of the circular side wall and the planar top wall can be inserted into the
5 hollow space of the female closure member defined by the interior of the circular side wall and the planar bottom wall, thereby resulting in the releasable securement of the two components together.

Without further elaboration the foregoing will so fully illustrate my invention that others may, by applying current or future knowledge, adopt the same for use under various conditions
10 of service.